Installation and Maintenance Manual

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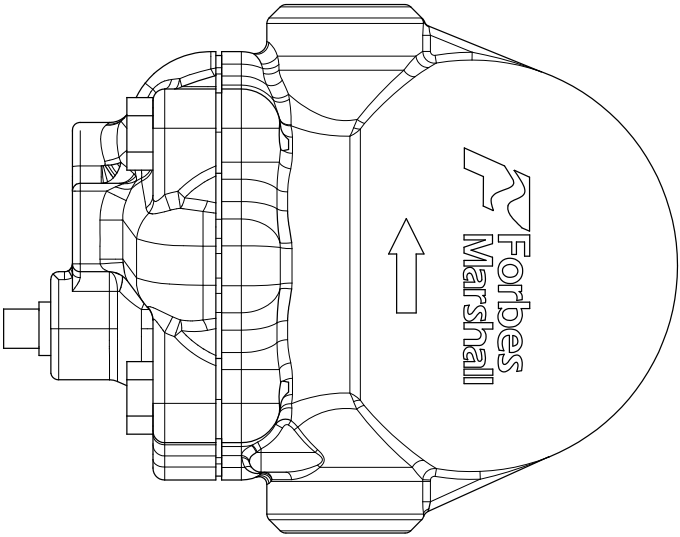
Forbes Marshall Air Eliminator

FMAE31



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PLEASE NOTE - Throughout this manual this cautionary symbol is used to describe a potential damage or injury that might occur if the safety considerations are overlooked. This symbol denotes CAUTION, WARNING or DANGER.

1. Preface:

This manual is intended for anyone using, commissioning, servicing, or disposing the below mentioned products safely and efficiently.

Forbes Marshall Air Eliminator [FMAE31]

Sizes: DN15 (1/2"), DN20 (3/4"), DN25 (1").

PLEASE NOTE:

Throughout this manual the following cautionary symbol is used to describe a potential damage or injury that might occur if the safety considerations are overlooked.

2. Important Safety Notes:

Read this section carefully before installing/operating/maintaining the product. The precautions listed in this manual are provided for personnel and equipment safety. Furthermore, Forbes Marshall accepts no responsibility for accidents or damage occurring as a result of failure to observe these precautions. Note that the product is designed to perform for non-contaminated fluids only. A contamination in the form of chemical, foreign particle etc. can lead to problem with product performance and life of the product.

If these products in compliance with the operating instructions are, properly installed, commissioned, maintained and installed by qualified personnel (refer Section 2.7) the safety operations of these products can be guaranteed. General instructions for proper use of tools and safety of equipments, pipeline and plant construction must also be complied with.

2.1 Intended use:

Check if the product is suitable for intended use/ application by referring to the installation and maintenance instructions, name plates and technical information sheets.

i) The product is suitable for use as defined in the technical information sheet. In case the need arises to use the product on any other fluid please contact Forbes Marshall for assistance.

ii) Check for the suitability in conformance to the limiting conditions specified in technical information sheet of the product.

iii) The correct installation and direction of fluid flow has to be determined.

iv) Forbes Marshall products are not intended to resist external stresses, hence necessary precautions to be taken to minimize the same.

2.2 Accessibility and Lighting:

Safe accessibility and working conditions are to be ensured prior to working on the product.

2.3 Hazardous environment and media:

The product has to be protected from hazardous environment and check to ensure that no hazardous liquids or gases pass through the product.

2.4 Depressurizing of systems and normalizing of temperature:

Ensure isolation and safety venting of any pressure to the atmospheric pressure. Even if the pressure gauge indicates zero, do not make an assumption that the system has been depressurized. To avoid danger of burns allow temperature to normalize after isolation.

2.5 Tools and consumables:

Ensure you have appropriate tools and / or consumables available before starting the work. Use of original Forbes Marshall replacement parts is recommended.

2.6 Protective clothing:

Consider for the requirement of any protective clothing for you/ or others in the vicinity for protection against hazards of temperature (high or low), chemicals, radiation, dangers to eyes and face, noise and falling objects

2.7 Permits to work:

All work to be carried out under supervision of a competent person. Training should be imparted to operating personnel on correct usage of product as per Installation and Maintenance instruction. "Permit to work" to be complied with (wherever applicable), in case of absence of this system a responsible person should have complete information and knowledge on what work is going on and where required, arrange to have an assistant with his primary goal and responsibility being safety. "Warning Notices" should be posted wherever necessary.

2.8 Handling:

There is a risk of injury if heavy products are handled manually. Analyze the risk and use appropriate handling method by taking into consideration the task, individual, the working environment and the load.

2.9 Freezing:

Provision should be made to protect systems which are not self-draining, against frost damage (in environment where they may be exposed to temperatures below freezing point) to be made.

2.10 Returning products:

Customers and Stockist are reminded that, when returning products to Forbes Marshall they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk.

This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

3. Brief Product Information:

3.1 Description:

The Forbes Marshall Air Eliminator, FMAE31, is a float type air vent for liquid systems. The body and cover are of cast iron and the complete unit is easily maintainable.

3.2 Sizes and End Connections:

DN 15,20 and 25 Screwed BSPT / NPT

3.3 Limiting Conditions:

PMA-Max. allowable pressure	13.0 bar g
TMA-Max. allowable temperature	220°C
TMO-Max.operating temperature	220°C
Cold hydraulic test pressure	26.0 bar g
∆ PMX- Max. differential pressure	13 bar g

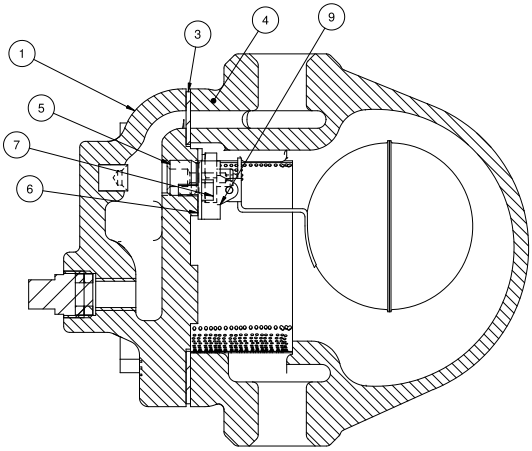
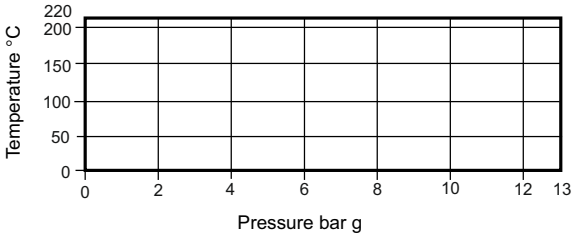


Figure 1: Forbes Marshall Air Eliminator

Material:

No	Part	Material	Standard
1	Base	Cast Iron	IS 210 FG 260
2	Cover Bolts	Carbon Steel	H T IS 1367 Gr.8
3	Cover Gaskets	SS Reinforced Exfoliated Graphite	
4	Cover	Cast Iron	IS 210 FG 260
5	Valve Seat	Stainless Steel	ASTM A743 Gr. CA 40
6	Valve Seat Gasket	Stainless Steel Type 420	ASTM A240
7	Set Screws	Stainless Steel Type 304	IS 1364
8	Ball Float and Lever	Stainless Steel Type 304	ASTM A240
9	Pivot Frame	Stainless Steel Type 304	ASTM A240

3.4 Operating Range:



3.5 Product Dimension and Drawing:

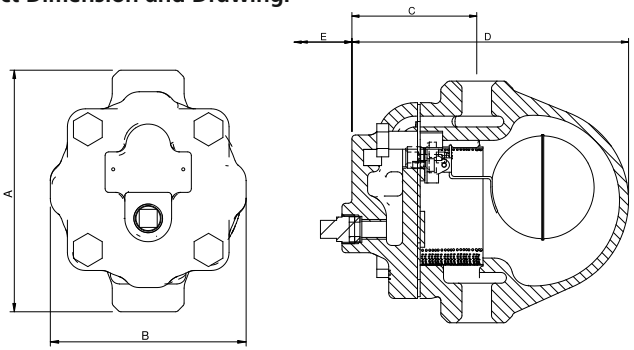
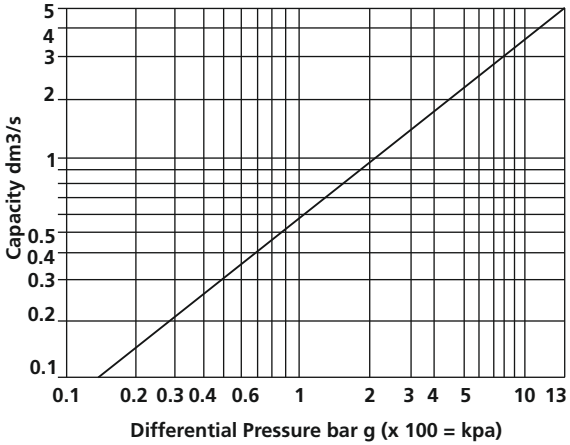


Figure 2: Dimensional Drawing of FMAE31

Dimensions (approx.) in mm:

Size	A	B	C	D	E	Weight
DN 15/20	130	109	72	152	120	4 Kg
DN 25	141	109	72	160	135	4 kg

3.6 Capacity Chart:



4. Product Working Principle: (Refer figure 1)

The Forbes Marshall Air Eliminator FMAE31 operates on the basis of the Buoyancy principle. It utilizes float lever assembly which releases air and gases and traps to condensate or water. Initially when the ball float and lever (8) is at the bottom, the lever connected to the float pulls the outlet valve off its seat (5) and the air present in the system is discharged. As the condensate fills inside the cover (4), the float and lever (8) rises up due to buoyancy and the valve sits on the seat (5), hence effectively preventing the escape of condensate.

5. Installation Guidelines: (Refer to Figure 3)

Note: Before implementing any installations observe the 'Important Safety notes" in section 2. Referring to the Installation and Maintenance Instructions, name-plate and Technical Information, check that the product is suitable for the intended installation.

1. Check materials, pressure and temperature and their maximum values.
2. Remove protective covers from all connections.
3. The Air Eliminator must be fitted into a vertical plane above the point being vented with the direction of flow as indicated so that the float arm falls and rises vertically.
4. Point the arrow on the name-plate downwards.
5. We recommend piping the discharge from the air eliminator to a suitable safe point.

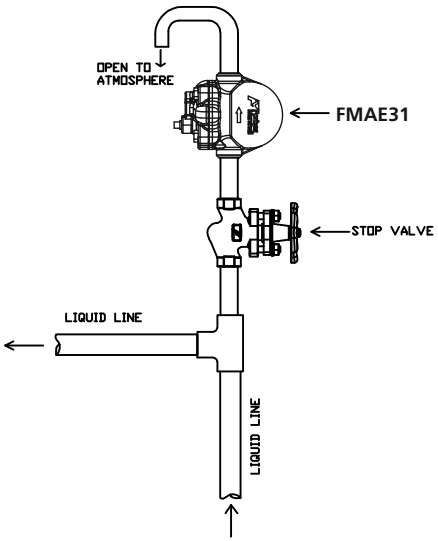


Figure 3: Forbes Marshall Air Eliminator installation vertically on condensate line

Note: If the Forbes Marshall Air Eliminator is to discharge to atmosphere ensure it is to a safe place, the discharging air or gas may be at a temperature of 100°C (212°F).

6. Start-up and Commissioning:

6.1. Flushing of lines:

As part of pre-installation all fluid handling equipment particularly piping should be thoroughly cleaned of scale and the internal debris which accumulates during construction. This is accomplished by blowing or flushing with air, steam, water and other suitable medium.

Note: For a detailed procedure on flushing of lines please visit Forbes Marshall website.

6.2. Commissioning:

After installation or maintenance ensure that the system is fully functioning by confirming fluid is passing through it.

1. After flushing of lines is complete, ensure isolation valve is opened.
2. Check for leaks and attend if any.

7. Maintenance Guidelines:

Before undertaking any maintenance on the product it must be isolated from both supply line and return line and any pressure should be allowed to safely normalize to atmosphere. The product should then be allowed to cool. With suitable isolation repairs can be carried out with the product in the line.

7.1. Routine and Preventive Maintenance:

Please refer to the maintenance schedule mentioned in the table below to undertake routine maintenance of the Forbes Marshall Air Eliminator

Sr. No.	Parameters to be checked	Frequency for checking and maintaining						
		Immediately	Daily	Weekly	Monthly	Quarterly	Half yearly	Annually
1	Repair / Replace Forbes Marshall Air Eliminator when testing shows leaks	Y						
2	Clean strainer screen of Forbes Marshall Air Eliminator				Y			
3	Clean internals of Forbes Marshall Air Eliminator					Y		
4	Visual inspection for leakages		Y					
5	Arresting any other leaks	Y						

7.2. Tool Kit:

To carry out any maintenance on the trap please use the tools mentioned below:

Components	Tool	Tool Size
Valve seat (4.1mm ID)	Box Spanner	17 mm (A/F)
M4 screw (valve seat) (4No)	Screw Driver	(12 inch)
M10 Bolt for outside covering	Box Spanner	17 mm (A/F)

7.3. Recommended tightening torques:

Components	Torque
Valve seat (4.1mm ID)	35 Nm
M10 Bolt for outside covering	25-35 Nm
Set Screw	2.5 - 3 Nm

7.4. Maintaining/ Replacing the main valve assembly : (Refer to Figure 1)

1. Unscrew cover bolts **(2)** and lift off the base **(1).**
2. Unscrew the assembly set screws **(7),** and dismantle the pivot frame **(9).**
3. Remove the valve seat **(5)** along with the valve seat gasket **(6).**
4. Replace the main valve assembly and the cover gasket **(3)** with a new one.
5. Refit the cover **(4)** by using the cover bolts **(2).**

8. Troubleshooting:

If the expected performance is unachievable after installation of Forbes Marshall Air Eliminator, check the following points for appropriate corrective results.

Failure Mode	Possible Cause	Remedy
Not discharging at all.	No air venting.	Check Installation. The arrow on the name plate must point downwards, the arrow on the casting indicates the flow direction.
		Check for blockage in the inlet strainer.
		Check for Valve and seat assembly blockage.
Leaking condensate.	Leakage through the outlet.	Check valve and seat assembly for any deposition.
		1. Clean and lap seating area. 2. Lightly stamp the SS ball on the seating area.
		Check if the float is damaged, if so replace it.
	Leakage through the trap body.	Tighten the cover nuts and bolts to recommended torque.
		Check gasket for damage, replace it.
Not discharging enough air.	Reduced venting capacity.	Check if the actual differential pressure is lower than the designed differential pressure.
		Check whether the inlet strainer is partially blocked.
		Check parameters and trap sizing. The trap will not discharge enough air if the actual size is below the recommended size based on the capacity.
		Check main valve seat orifice for blockage. If blocked, clean and lap.

Note: Never attempt to modify the product. When replacing old part with new part, use the spares parts listed in Section 9.

9. Available Spares:

Spare part	Part No.	Spare code
Main Valve Assembly (DN 15/20)	A, B,C,D,E,F,T	S2031856
Main Valve Assembly(DN25)	A,B,C,D,E,F,T	S2031942
Set of Gaskets (Packet of 5)	B,T	S2005478
Float assly (DN15/20)	C	S2005484
Float assly (DN25).	C	S2005487
Screen Kit	G	S2005480

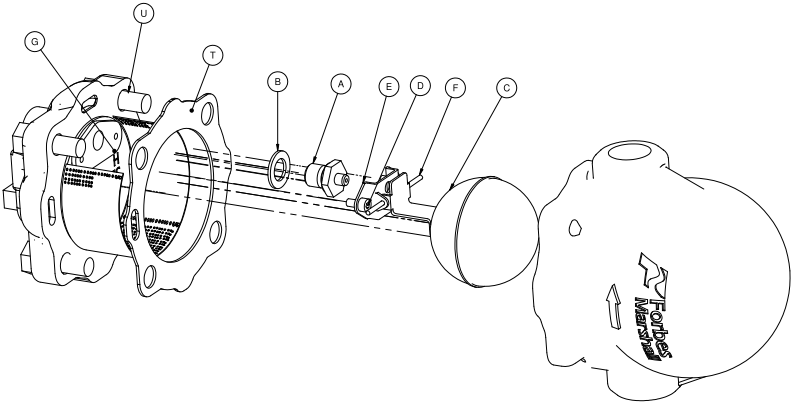


Figure 4: Exploded View of Forbes Marshall Air Eliminator

How to Order:
Example : DN 20 Forbes Marshall Air Eliminator FMAE31 Screwed BSPT.

How to Order Spares:
Always order spares by using the description given in the column headed "Available Spares" in user manual.

10. Warranty Period:

As per the ordering information and agreement in the contract.

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